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ABSTRACT

Several researchers have stated that male and female students have different microcomputer experiences which result in qualitatively different computer literacy. Data suggest that differences may result from different guidance to the student from family and school. A descriptive study was undertaken to discover the information resources and influences with whom or with which business education students interact concerning microcomputers. High school students (N=526) from 26 business education classes in 11 southeastern Michigan schools responded to a survey on background information, persons with whom they discuss microcomputers, persons who have influenced them, and kinds of sources they would prefer to seek given specific microcomputer related tasks. Analysis of responses supports the gender differences identified in the earlier literature. While students of both genders reported favorable attitudes toward microcomputers in general, they differed in their communications about microcomputers. More male students reported that persons were general contacts and significant influences than did female students. Female students reported talking about computers equally to men and women, while male students reported that four-fifths of their contacts were male. Nearly one-half of the contacts reported by males were friends, with family members making the next largest group. Female students reported family contacts more often than they did friends. In regard to non-personal resources, female students were more positive than males toward the use of visual materials, while male students were more positive toward reading than were female students. These findings suggest that, although students in general appear to have the necessary confidence and interest in using microcomputers, they may need help in developing wider sources of information in order to succeed. (Author/NB)

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# THE BUSINESS EDUCATION STUDENT AND MICROCOMPUTERS: SOURCES OF INFLUENCE AND INFORMATION

Prepared for

The Woman Researcher 1985
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## ABSTRACT

Several authors and researchers state that male and female students have different microcomputer experiences, resulting in qualitatively different computer literacy. Data from these studies suggest that such differences may result from different guidance to the student from family and school. Do the sources of information and influence accessed by secondary level students differ based on gender? The purpose of this descriptive study was to discover the current status of business education students' communication resources.

Analysis of responses from 526 secondary students from 26 business education classes in 11 southeastern Michigan schools supports the gender differences identified in the earlier literature. While students of both genders report favorable attitudes toward microcomputers in general, they differ in their communications about microcomputers. More male students report persons as general contacts and as significant influences than do female students. Female students talk about equally to men and women; male students report that four fifths of their contacts are male. Nearly half the contacts reported by males are friends, with family members making the next largest group. Female students report family contacts more often than they do friends.

The report details these and other differences in personal and nonpersonal resources and suggests replication of the study in other academic areas as well as over time.

## SECTION I

## THE BUSINESS EDUCATION STUDENT AND MICROCOMPUTERS: SOURCES OF INFLUENCE AND INFORMATION

### Origin of the Study

Frequently a provocative statement questions the social effects of educational action. Such a statement was made by Dr. Sherry Turkle (1984), writing in Technology Review. She states

> Some schools . . . have started special after-school computer programs for girls so they can avoid direct competition with boys. Educational specialists have also made recommendations for how computers can be introduced in ways less 'discriminatory' to women. One specialist, for instance, suggests that introductory courses should not stress computer programming, but rather applications such as word processing, which might be more likely to interest girls.
>
> This last recommendation may open the possibility for a new kind of gender discrimination. Teachers will continue to encourage boys to program because they expect them to be good at it. But with a different set of expectations, they will encourage girls to use the computer with pre-packaged programs. Thus, boys will learn how to use programming tools to make the computer their own, while girls will develop a more passive, less empowered relationship with it.

This statement directly affects business educators, for whom the microcomputer is increasingly relevant in both general and vocational business education at the secondary level. This study began as an investigation of whether gender differences existed among business education students in their relations with sources of influence and information about microcomputers.

## Statement of Purpose

The purpose of the study is to present a status report on the sources of information and influence with whom business education students interact so that teachers can intervene more effectively to provide equity of access and experience. Specifically the study attempts to answer these questions:

1. Who do students talk to about microcomputers? How many people do they talk to? What are the genders of these contacts? What are the relationships of these contacts to the students?

2. Who are the persons who have most influenced students about microcomputers? What are the genders of these "significant others"? What are the relationships of these significant others to the students?

3. Do female students access different kinds of personal sources than male students? Are there differences between male and female students in the number of personal contacts they report?

4. Are there differences in other kinds of information sources (nonpersonal) that male and female students seek out?

## General Methods

A three-page survey was designed to secure student reports on background information, individuals with whom they discuss microcomputers, "significant others" who have influenced them, and kinds of sources they would prefer to seek given specific microcomputer-related tasks. The survey was pretested with approximately 60 secondary students and revised.

All members of the Gamma Alpha Chapter (Eastern Michigan

University) of Delta Pi Epsilon (the national business education research society) who teach at the secondary level were asked to participate. In all, 28 secondary level business educators were contacted. Classes volunteered by the respondents were screened according to several criteria. The criteria for classes required enrollment by both male and female students, enrollment across several grade levels, and instruction which did not involve microcomputers.

This report is based on 26 classes in 11 southeastern Michigan schools which met these criteria. Usable data were obtained from 526 students. In all, 17 business educators participated in the study. Except for summaries of relationships reported by students, all statistics use classrooms as the unit of analysis. This includes analyses of related samples with the Sign Test (Siegel, 1956).

## Organization of the Report

Section II reviews relevant studies on gender and computer experiences to provide background. Section III reports student background and their attitudes about microcomputers and tasks requiring microcomputers. The section then describes student responses about their sources of information and influence. Section IV discusses the implications of the results and directions for additional research.

## SECTION II

## REVIEW OF LITERATURE

The literature on the relationship between gender and microcomputers reflects the diverse use of microcomputers in education: as an object of study in developing computer awareness, as a tool with prewritten application software, as a tutor in computer-assisted instruction, and as a "tutee" responding to the programming accomplished by the student. Campbell (1983) identifies these uses as part of inequity of access, with "disadvantaged" students having different qualitative experiences than gifted students. Anderson et al. (1984) also describes socioeconomic aspects of access to microcomputers. A MICROgram report (1984) summarizes legislation and studies relating to equity of access by female students to microcomputers.

Although the bibliography reports studies which relate to several aspects of gender and microcomputer use, this review touches on those reports which relate to the narrower concern for students' communications about microcomputers and their preferred sources of information about microcomputers.

Lockheed et al. (1983) examined factors related to gains in computer literacy as tested by pre- and post-test measures on cognitive and affective dimensions. In general, girls gained less and boys more than predicted. Girls in accelerated math classes gained more than girls in regular classes and more than boys in accelerated math classes. Female students who asked the

teacher for help gained more than female students who did not.

Lockheed speculates that some of the differences in classes may have been due to the presence of "computer buffs" who aided the teacher in individualizing instruction. But, she says, literature in mathematics education suggests that students seek same-sex help from peers. The absence of female computer buffs in the same proportion to male computer buffs may have depressed female gains in literacy. Lockheed and Frakt (1984) address further the problem of stereotyping the computer as "a male machine" and gender differences in attitudes toward programming as compared to applications use of the computer.

D'Onofrio and Slama (1984) report that cognitive gains in computer literacy are related to family discussion of purchasing a microcomputer and to several school factors (computer usage in school, enrollment in computer classes, teacher and counselor encouragement, feelings about science, and others). Affective gains relate to family discussions and several school factors as well, including teacher and counselor encouragement. While the analyses do not address gender differences, D'Onofrio and Slama state

> . . .[F]emale students in business education classes may be less favorably disposed toward math and science than males, reducing their potential for excelling in the learning of computer literacy.

Mosley et al. (1984) report no difference among students' selection of computer-assisted instruction versus traditional instruction based on feedback during the sessions. Girls were just as likely as boys to select computer-assisted instruction regardless of feedback.

Linn (1983) cites California statistics on enrollment in computer-related instruction:

> . . .[F]emales comprise 42% of the 51,481 participants in high school instruction which involves computers; when they do participate, females are 86% of the students in word processing courses and only 37% of the students in programming courses. Thus females participate more frequently in courses which are less likely to foster higher cognitive skills.

Based on recorded observations of students and their remarks during a problem-solving task using already-constructed software, Linn cites these findings:

1. Boys were more likely than girls to go beyond the information given. Girls tended to follow instructions more diligently with less successful results.

2. Boys were more optimistic about the results of their problem solving; girls more often predicted their solutions would fail.

3. Girls made verbal comments which were more likely to be self-deprecating ("I'm stupid," "I don't understand this," etc.) than boys did.

4. Boys predicted the success or failure of their outcomes more accurately than girls.

5. Boys were more likely to attribute failure to strategy, but girls related failure to ability; boys were more likely to attribute success to task difficulty and strategy, but girls attributed success to luck.

6. Girls sought more help and approval than boys, perhaps believing that persons in authority held information of importance.

Hess and Miura's study (1983) of computer class/camp enrollment shows: a ratio of roughly three boys to every girl in university, private, or public school programs; enrollment declines for females as age increases; and enrollment declines for girls as programming content increases in difficulty. Family decisions, the authors note, influence enrollment when tuition is required.

What should be apparent from this summary is that, directly or indirectly, differences in experiences by gender are affected by the contacts the student has. An exploration of those sources of information and influence should shed light on those differences.

## SECTION III

## FINDINGS OF THE STUDY

### Background of Classes and Students

Twenty-one of the 26 classes were general business (accounting, introduction to business, typing, business practices, and others); two were vocational business; and one was a non-business personal economics class. This latter class was the only one required of students; all the others were elective. No information was available on this background for two classes.

Table 1 reports the makeup of the 26 classes by gender for total enrollment. The actual makeup of the 526 respondents reflects some absenteeism on the day of the survey and some disqualified surveys. Surveys were disqualified if the gender of the student was not reported.

Table 1
Gender of Classes Comparing Total Enrollment to Survey Responses

| Gender | Percent of Group | |
|---|---|---|
| | Total Enrollment | Survey Responses |
| Male Students | 36.1% | 39.5% |
| Female Students | 63.4% | 61.5% |

The classes have predominantly female enrollments.

Table 2 reports the total enrollment by grade level as reported by teachers and on usable surveys.

Table 2
Grade Level of Classes Comparing
Total Enrollment to Survey Responses

| Grade Level | Percent of Group | |
|---|---|---|
| | Total Enrollment | Survey Responses |
| Ninth Grade | 12.4% | 14.0% |
| Tenth Grade | 34.6% | 38.9% |
| Eleventh Grade | 31.0% | 30.0% |
| Twelfth Grade | 22.0% | 17.1% |

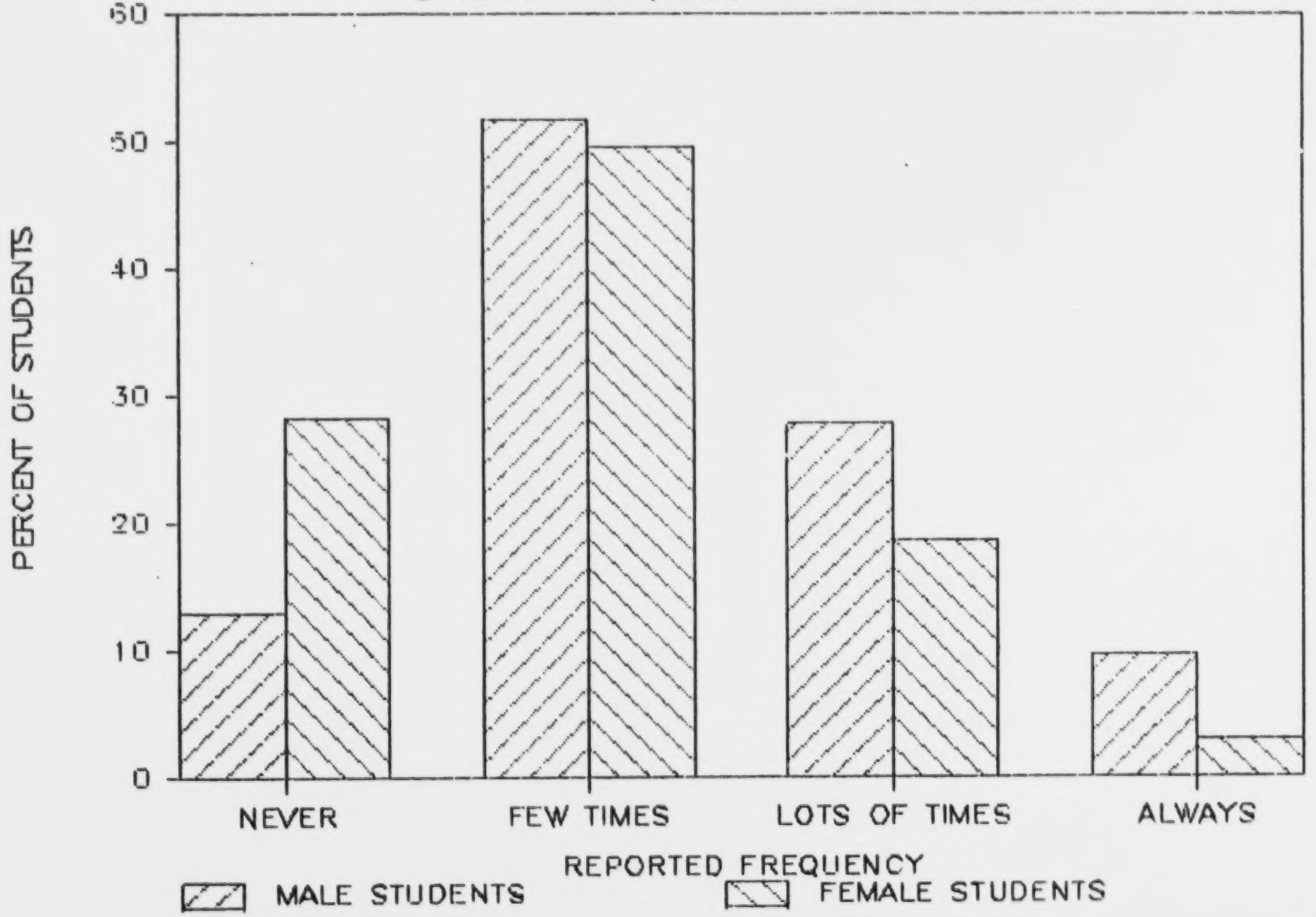
The ethnic background of the group, according to teacher reports, is predominantly white: 83.6% White, 13.5% Black, 1.9% Hispanic, and 1.0% Other.

The 17 teachers report their students to be typical of the overall school population in family income and language ability and only slightly lower in mathematics ability, computer interest, and computer usage.

Secondary students report different levels of microcomputer use according to their gender. Figure 1 shows the response options available and student response by gender. The average reported use for female students is 1.99 ("a few times"; for male students, the average is 2.29 (slightly higher than "a few times"). Male students do report higher perceived use of microcomputers, but, on the average, neither gender perceives its experience level as very high. Male students are, however, more likely to report use "all the time" than female students, and female students are more likely than male students to report no use (the "never" response).

# FIGURE 1

PERCEIVED FREQUENCY OF USE BY GENDER



## Attitude Toward Microcomputer Tasks

Students were asked to respond to a "what if" situation which described a classroom assignment. The results of the assignment would influence the grade but could not, in itself, result in either passing or failing the course. Students were asked to rate their interest on a five-point scale (1=low and 5=high) to the content and microcomputer dimensions of the assignment.

The content for half the students related to mathematics; for the other half, the assignment involved writing. The microcomputer could either be programmed by the student or supplied with prewritten application software.

Student ratings of interest in the task content, programming, and application software are shown in Table 3:

Table 3
Student Ratings of Interest in Class Assignment

| | Male Response | | Female Response | |
|---|---|---|---|---|
| I would be interested in | Mean | S | Mean | S |
| . . . task itself | 3.61 | .41 | 3.78 | .42 |
| . . . programming | 3.75 | .34 | 3.53 | .50 |
| . . . using application software | 3.81 | .49 | 3.56 | .54 |

All ratings are close and somewhat positive. Female students are slightly more favorable than male students toward the content of the assignment but slightly less favorable toward the use of the microcomputer. Neither male nor female students made distinctions in their interests between programming and

application use, however. The Sign Test for related samples shows no statistically significant differences among these items due to gender. There is no evidence to suggest that male and female students differ in the kind of interest they have in microcomputer use. They are somewhat positive in their responses across the board.

One half of the students were then told that their specific task was to program the computer; the other half was told they were to use application software. Three items assessed their attitude toward the assignment. Using a five-point scale (1=disagree to 5=agree), students responded to the statements, "I would probably . . . not try to do the assignment, try but not succeed in doing the assignment, experiment on the microcomputer." Table 4 summarizes student responses by gender:

Table 4
Probable Approach to Microcomputer Assignment

| | Male Response | | Female Response | |
|---|---|---|---|---|
| I would probably . . . | Mean | S | Mean | S |
| . . . not try | 2.38 | .59 | 2.15 | .37 |
| . . . try but not succeed | 2.60 | .57 | 2.46 | .36 |
| . . . experiment | 3.70 | .54 | 3.80 | .36 |

Male responses are less extreme than female responses, but male responses show greater variability. The Sign Test for related samples shows no statistically significant differences among responses due to gender.

## Student Reports of Personal Contacts

Students were asked to list the first names of individuals with whom they discuss microcomputers. They were also asked to state the relationship of these persons to themselves (friend, salesperson, counselor, etc.).

Most students (77.5 percent) include microcomputers in their conversations with others. Those who do not report any individuals with whom they discuss the topic are more likely to be female: 27.1 percent for female as compared to 20.2 percent for male. Of those responding, male students reported conversations with, on the average, 3.8 persons; girls reported 3.6 persons.

Boys reported conversations with 644 persons, 82.3 percent of whom were male and 17.7 percent of whom were female. Girls reported 786 contacts, 49.2 percent of whom were male and 50.8 percent of whom were female. From another perspective, of the male contacts reported, 55.3 percent were reported by male students, with 44.7 percent reported by female students. In contrast, male students reported only 23.9 percent of the female contacts, with the remaining 76.1 percent reported by female students.

The relationship of these contacts to the students fell into several main categories with a sprinkling of other relationships. Table 5 shows relationships reported at least two or more times along with the percent of the total made up by each category:

Table 5
Relationship of Contacts
by Gender of Student

| Relations for Male Students | | | Relations for Female Students | | |
|---|---|---|---|---|---|
| Title | Number | Percent | Title | Number | Percent |
| Friend | 310 | 49.3% | Friend | 269 | 34.9% |
| Teacher | 102 | 16.3% | Teacher | 164 | 21.3% |
| Father | 48 | 7.6% | Father | 81 | 10.5% |
| Mother | 32 | 5.1% | Mother | 73 | 9.5% |
| Brother | 35 | 5.6% | Brother | 51 | 6.6% |
| Sister | 12 | 1.9% | Sister | 31 | 4.0% |
| Cousin | 22 | 3.5% | Cousin | 16 | 2.1% |
| Uncle | 14 | 2.2% | Uncle | 15 | 1.9% |
| Aunt | 3 | - | Aunt | 15 | 1.9% |
| Relative | 10 | 1.6% | Relative | 11 | 1.4% |
| Girlfriend | 3 | - | Boyfriend | 17 | 2.2% |
| Neighbor | 4 | - | Neighbor | 2 | - |
| Family Friend | 8 | 1.3% | Family Friend | 5 | - |
| Work Contact | 6 | 1.0% | Work Contact | 4 | - |
| Counselor | 7 | 1.1% | Counselor | 9 | 1.2% |
| Salesperson | 12 | 1.9% | Salesperson | 3 | - |
| Librarian | 1 | - | Librarian | 5 | - |
| Total | 629 | | Total | 771 | |

Friends account for nearly one half of the personal contacts of male students; they constitute slightly more than one third of the contacts of female students. Family accounts for 28 percent of the contacts of male students, but 38 percent of the contacts of female students are family members. Considering only male family members (fathers, brothers, and uncles), male students report 15.4 percent of their contacts in this category, while female students report 19.1 percent of their contacts are male family members. In contrast, female family members (mothers, sisters, and aunts) are 7.5 percent of male students' contacts and 15.4 percent of female students' contacts.

Considering contacts with school personnel, counselors,

librarians, and others (other school titles, like principal, were not mentioned by students) are relatively unimportant for most students. Only teachers are spontaneously mentioned by students. Teachers are more frequently mentioned by female students than by males students (21.3% and 16.3% respectively).

### Student Reports of Significant Others

Students were asked to list the first name and relationship of the "one person who has most influenced you about microcomputers." This person is referred to in the report as a "significant other." Fewer students reported a significant other than reported conversations about microcomputers. Seventy-four percent of male students reported a significant other; 64.8 percent of female students reported significant others. This drop in the number reporting is not primarily due to disqualified answers. Disqualified answers were reports for which gender could not be determined or which named the student him/herself, not another person. Overall, female students were less likely than male students to name a significant other.

Male students reported 154 significant others, 87.7 percent of whom were male and 12.3 percent of whom were female. Female students reported 56.3 percent males significant others and 43.7 percent female significant others. Table 6 reports the relationships of these significant others mentioned at least two or more times.

Table 6
Relationship of Significant Others
by Gender of Student

| Relations for Male Students | | | Relations for Female Students | | |
|---|---|---|---|---|---|
| Title | Number | Percent | Title | Number | Percent |
| Friend | 54 | 37.2% | Friend | 32 | 15.9% |
| Teacher | 42 | 29.0% | Teacher | 72 | 35.8% |
| Father | 20 | 13.8% | Father | 28 | 13.9% |
| Mother | 4 | 2.8% | Mother | 36 | 17.9% |
| Brother | 9 | 6.2% | Brother | 12 | 6.9% |
| Sister | 0 | 0 | Sister | 4 | 2.0% |
| Cousin | 7 | 4.8% | Cousin | 3 | 1.5% |
| Uncle | 2 | 1.4% | Uncle | 5 | 2.5% |
| Aunt | 1 | - | Aunt | 4 | 2.0% |
| Girlfriend | 1 | - | Boyfriend | 5 | 2.5% |
| Neighbor | 2 | 1.4% | Neighbor | 0 | - |
| Salesperson | 3 | 2.1% | Salesperson | 0 | - |
| Total | 145 | | Total | 201 | |

Friends are mentioned by male students more than twice as often as by female students. Based on the reports of fathers and mothers, parents are mentioned twice as often by female students as by male students. Mothers are mentioned six times more often by female students than by male students (17.9% to 2.8%) as their most important influence. Teachers are important influences for both male and female students, but are mentioned by more than a third of female students as a significant other (35.8%) compared to 29.0% for male students.

## Preferences for Personal and Nonpersonal Resources

Students were asked about the resources they would prefer to use in completing a microcomputer assignment (See Section II). Three personal sources were suggested: the teacher, a classmate or peer, or an outsider. Students used a five-point scale to

describe their probable use of the source (1=definitely no to 5=definitely yes). Table 7 shows the means and standard deviations of the responses to each item:

Table 7
Response to Probable Use of Personal Resource

| | Male Response | | Female Response | |
|---|---|---|---|---|
| Probable use of . . . | Mean | S | Mean | S |
| . . . teacher | 3.72 | .53 | 4.01 | .38 |
| . . . peer | 3.66 | .45 | 3.73 | .37 |
| . . . outsider | 3.59 | .52 | 3.32 | .43 |

Female students are more certain they would use teachers and peers as resources for microcomputer tasks than are male students. Females are less certain they would use an outsider. The Sign Test for related samples shows statistically significant differences regarding female students' preferences for teachers as resources ($p<.01$) and male students' preferences for outside persons as resources ($p<.05$).

Students were asked to state how likely they would be to use non-personal resources/approaches in solving a microcomputer assignment: reading a book or manual, writing the problem out, or viewing audio-visual material (slide/tape or video). Students used a five-point rating scale (1=definitely no to 5=definitely yes). Table 8 shows student responses by gender:

Table 8

Response to Probable Use of Non-Personal Resource

| Probable use of . . . | Male Response Mean | Male Response S | Female Response Mean | Female Response S |
|---|---|---|---|---|
| . . . reading | 3.72 | .39 | 3.58 | .41 |
| . . . writing | 3.39 | .50 | 3.52 | .29 |
| . . . viewing | 3.11 | .37 | 3.27 | .44 |

Male and female students rank non-personal approaches similarly. Male students give reading as a resource the same rating as they give teachers as resources. Female students place reading below both teachers and peers as resources. Neither male nor female students are certain that they would seek writing or viewing activities in solving their microcomputer activities, although female students are more likely to attempt writing than seeking an outsider for assistance. The Sign Test for related samples reveals statistically significant gender differences for males' preference for reading ($p<.01$) and for females' preference for viewing instructional materials ($p<.01$).

## SECTION IV

## SUMMARY AND DISCUSSION

Male and female students differ in several ways in their communications about microcomputers. They do not differ, however, in their attitudes toward and interest in microcomputers.

Male and female students rank using pre-written software before programming skills in reporting their interest. Males are slightly more positive in their attitudes toward microcomputer elements of a task, but both male and female students report positive reactions. Both male and female students rank their willingness to experiment and their desire to try similarly. This suggests that both have confidence in their ability to succeed. Female students are slightly more definite in their views.

More male students report persons with whom they discuss microcomputers than do female students. More male students report significant others than do female students. Among students reporting contacts, however, there is no difference in the average number of contacts they report.

Half the contacts reported by female students are male and half are female. Male students, however, report that four fifths of their contacts are male. Nearly half of the contacts reported by male students are friends, with family members making the next largest group (28 percent). Female students report family

contacts more often than they report friends. Mothers are two times more likely to be mentioned as contacts and six times more likely to be mentioned as significant others by female students. Parents are significant others for female students more than twice as often as they are for male students. Teachers are more important to female students than to male students as contacts, significant others, and preferred resources.

Female students are more positive than male students in their preference for visual materials. They are also less positive than male students in their preference for outside persons to serve as resources. Male students place as much emphasis on reading as a resource as they do on teachers, and male students are more positive toward reading than are female students. There appears to be no gender difference in preferences for peers or for writing as resources or approaches to completing microcomputer tasks.

This study lends no credence to the assumption that female students prefer to use applications software and that male students prefer to program. The study also shows male and female students are willing to experiment with the microcomputer. There is no evidence that female students desire to assume a passive role with the microcomputer. Neither is there any evidence to suggest that the students view using application software as less desirable than programming skills. Both are rated similarly by both genders.

The topic of microcomputers, however, appears to evoke many same-gender conversations for male students. Female students

appear to have conversations with both males and females, but females apparently are unlikely to become significant others for male students.

Females, as suggested in the literature, do count on teachers as sources of information more than males do. The picture of their preferred resources suggests that females, after accessing teachers and classmates, have no other personal resources. Their resources on the topic of microcomputers may be constricted because their resources are constricted in general. This is supported by the number of female students who apparently have no contacts to report and no significant others.

Non-personal resources for learning, like viewing visual media or writing as a means of clarifying ideas, are judged with some uncertainty. It is clear, however, that male students value reading more than female students do as a means of finding solutions to problems.

Teachers need to look at the particular communication networks of their students because the assumptions held by the individuals within these networks are likely to influence student performance. Students appear to come with the necessary confidence and interest to the microcomputer, but students may need to be helped to develop wider sources of information in order for them to succeed.

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